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ABSTRACT

This study examined the efficacy of a class discussion conducted by listserv which was used instead of classroom meetings for a graduate seminar. Research focused on whether this mode of communication was successful for the purpose of the course, and how this mode of communication could be improved as a means for replacing or supplementing face-to-face classroom discussion. Eight students and two faculty members made up the discussion group. Data were collected through analysis of all of the listserv messages, a student questionnaire, and interviews with instructors. Results indicated that: this method of communication was successful for the purpose of this class; students critically analyzed and synthesized reading material; and the listserv had the advantages of greater opportunity to consider responses and convenience compared to face-to-face discussion. Disadvantages were that the listserv was very demanding and time consuming and that visual and auditory nuances were missed. Improvements suggested included keeping the discussion on the topic, limiting the time for discussion, being sure everyone participated, and not being required to lead the discussion for a full week. The student questionnaire with a summary of responses is included. (AEF)

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Evaluation of a Graduate Seminar Conducted by Listserv

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Abstract

This study examines the efficacy of a class discussion conducted by listserv which was used instead of classroom meetings for a graduate seminar. Advances in communication have stimulated educators to evaluate new methods of instruction taking advantage of the growing interest in distance learning.

Educators have recognized that the advent of computers and the World Wide Web is profoundly changing the methods used in education (Goodman, 1995; Polyson, Saltzberg, Goodwin-Jones 1996; Boon, 1996). One aspect of this evolving field is the use of listserves for distance learning and specifically its use as a means of distance classroom interaction (Partee, 1996).

The impetus to use e-mail for educational purposes is derived from the many possible advantages it offers. Theoretically, e-mail, in a distance learning environment, should allow a means for interaction among diverse students and teachers that would otherwise be missed in a classroom situation. Also, by overcoming the problems of distance and time, e-mail may allow students from great distances and other cultures to participate in the class, and consequently to enhance the value of the course for all the participants. Furthermore, e-mail may allow interaction at the convenience of the participants (Partee, 1996). Another advantage of e-mail is the time it allows the user to construct responses that are well thought out and not time limited as in traditional classroom seminars. With the increasing use of e-mail in education, it is important to make the best use of this modality. Having this objective in mind, the focus of this study was to evaluate the communication that transpired during a graduate seminar conducted by listserv. This study was exploratory in that the goal of the study was "to investigate a little understood phenomena" (Marshall and Rossman, 1995, p. 41) and to identify strengths and weaknesses in order to "generate hypotheses for further research" (Marshall and Rossman, 1995, p.41). It is not a definitive study.

Review of the literature

While there is increasing information about the use of telecommunication in learning and the use of the Internet for communication and discussion groups, there is very little information on the actual use of e-mail in conducting a class by listserv. One study completed at Queens University in Belfast compared computer-supported seminars with face-to-face seminars (Newman, Johnson, & Webb, 1996). They found that critical thinking was deeper in computer conferences. The evidence of critical thinking was demonstrated by the cognitive reasoning skills. The Belfast study group developed a set of paired opposites, one an indicator of surface processing and one of in-depth processing. "For example, making judgments without offering justification, versus setting out the advantages and disadvantages of a situation or solution." (Newman, 1996, p.66). They also found that the students in the computer conferences brought in more outside relevant material and were better at linking together ideas and solutions. On the other hand, the face-to-face seminar students came up with new ideas more often. The e-mail students seem to have a more serious style and produced a higher ratio of important statements.

Another paper described the results of a conference for teachers in which interactive e-mail discussions were conducted over a period of 2 months prior to a 3 day seminar and for 1 month afterwards (Rud, 1995). The participants felt that the use of computer communication allowed them to explore their own practice as a teacher more by fostering awareness of wider issues in information technology. It also brought to attention multiple avenues for effectiveness in teaching many kinds of students. Furthermore, it allowed them to share ideas with others who lived at a distance from them.

A study of communication patterns among undergraduate student groups using e-mail was done at the University of Minnesota by Miller (1994). The study was of exploratory nature, but it did demonstrate the ability to manage micro-level communication dynamics in the transcripts. Another report on the use of a listserv in a communication course at a liberal art college concluded that e-mail afforded a valuable additional channel of communication between instructor and students (Bruning, 1995). A report on the use of a listserv for a graduate

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elementary education course concluded that the listserv enhanced both the graduate and teaching experience of the teachers while providing an alternative communication option (McGinnis, 1995).

A study by Ross (1995), provided four recommendations for using a listserv.

1. Technical factors must be addressed to insure easy confident communication.
2. Novice users need skill development with the technology. This skill can be a prerequisite for the class or training in e-mail becomes part of the course content.
3. Arrangements for setting up students' accounts should be made in advance.
4. Students should be informed early on about the expectations of their participation on the listserv.

Because of the growing use of e-mail communication it is important for educators to learn how best to use this new method of instruction. It is necessary for teachers to learn from the experience of those already using this method so that they may better formulate their own teaching program.

Research Questions

The purpose of this study was to examine what kind of communication transpired during a graduate seminar in which the discussion was conducted by listserv. Two questions were of primary interest in this study. First, was this mode of communication successful for the purpose of the course? The purpose of the course was for each student to demonstrate the ability to critically analyze and synthesize theoretical and conceptual works from the field of instructional design and technology. To answer this question, these questions were asked, .

9. Was there evidence of critical thinking by the students revealed in the e-mail communications?
10. Did the students correctly understand the previous communications?
11. Were any misunderstandings corrected?
12. Were emotions revealed in the communications?

The second question was how could this mode of communication be improved as a means for replacing or supplementing face-to-face classroom discussion?

Methodology

Participants

Eight students and two faculty members made up the discussion group. Of the students, five were female and three were male. There was one female and one male faculty member. Six students were working on their Doctorate of Education degree, and two students were working on their Master of Science degree. All the students had a concentration in ID&T. Students could use either a free University e-mail account or any e-mail account of their choosing.

Design of the study

This is a retrospective study examining all of the listserv messages that occurred during the seminar. The participants, both students and faculty, were unaware that this study would be conducted. The listserv software automatically archived all e-mail messages for future use. In addition to study of the listserv messages, all the students were asked to complete a questionnaire a the end of the course. The instructors were interviewed concerning their impressions about the use of listserv for the discussion in this class.

The class chosen for this study was a seminar in Instructional Design and Technology: Perspectives Past, Present, Future led by Dr. Gary Morrison and Dr. Deborah Lowther at the University of Memphis. The class met twice face-to-face at the beginning of the semester and once at the end. Other than these three meetings, the class was conducted by listserv. Twenty percent of the student's grade was based on their participation in the class discussion.

This class was chosen for analysis because it was one of the first efforts using listserv as a means of class discussion at the University of Memphis. In many ways this course provided an ideal subject for analysis to answer the questions proposed by the research inquiry. The course had a small number of students, so everyone had ample opportunity to participate in the discussion. The students and instructors were all computer competent. Another advantage in the choice of this course was that the discussion played a significant role in developing the purpose of the course and leant itself well to the use of listserv.

Procedure

A listserv is a mailing list of collections of e-mail messages that pertain to specific topics of interest. The e-mail messages are collected at one site, also called a listserv, and mass e-mailed to those who subscribe to the

particular list (Settles, 1995). All the posts that were generated as part of this course were archived and used as the basis of this study. Because of the nature of the research questions and the data to be analyzed, it was decided to use a qualitative analysis approach for this study.

The data, questionnaires, and interview transcripts were analyzed by one researcher and verified by a second reviewer. Where disagreement occurred a consensus was achieved through discussion.

Where names were used in the quoted communication, names were changed to protect the anonymity of the participant, but the gender of the participant remained the same.

The first step in analyzing the communications was to count the total number of communications that occurred as part of the class discussion during the eight week summer session. Then, the number of communications by each instructor and each student were totaled. The messages were then analyzed by the thematic content analysis method (Marshall, & Rossman, 1995). Question #1 was answered by using a subset of questions, a-e, answered "yes" or "no" and using all the posts of the students as the basis of decision. These questions have been outlined by Mason (1991) to evaluate critical thinking in computer communication.

26. "Did the participants make reference to previous messages?"
27. "Did they draw on their own experience?"
28. "Did they refer to course materials?"
29. "Did they refer to relevant materials outside the course?"
30. "Did they initiate new ideas for discussion?"

(pg. 114).

To answer question #2, each communication was classified as "yes" or "no." The answer to question #3 will be in narrative form as analysis if the communication indicates there was misunderstanding. For question #4 the instances of emotion were enumerated, categorized, and evaluated.

The definition of humor used in the context of computer mediated communication (CMC) follows the criteria of Chiaro, Hymes, Oring, and Palmer. Humor occurs when there is a sudden incongruity or transgresses normalcy (Palmer, 1992). This is dependent on the surrounding linguistic, geographical, sociocultural, and personal boundaries of the people for whom the humor is intended (Chiaro, 1992, Oring, 1992, and Palmer, 1994). The framing of humor is also important. A wink, a gesture, or musical accompaniment are examples of cues that are sometimes used in face-to-face communication (Hymes, 1994). In CMC these cues are more limited, but included the use of emoticons or wording to point out that something is meant to be funny.

After tabulation of the results of questions #1 through #4, the investigator sought to answer the following questions to complete the answers to the first research question.

- Did the on-line communication contribute significantly to the value of the course?
- What improvements could be made in the on-line discussion?
- What were the strengths of this type of communication?
- What were the weaknesses?
- Did students change or broaden their views?

A questionnaire with 13 questions was sent to each student participant to assist in answering these questions. Both faculty members were interviewed as part of the study.

Results

Analysis of e-mail messages

The first analysis was to determine the extent of critical thinking by the students. Out of a total number of 464 communications by the students, the vast majority referred back to a previous message. One student said, "I was surprised by the lack of agreement on a definition of ID in our seminar group. I expected the article authors to disagree, but I was not prepared for the diversity of opinion among our class members." Another example, "In response to Joanne's question, computer...." There were only seven instances when the students failed to refer to another message. An example of this was, "Sorry other ID Seminar people, but I needed to reach George and his e-mail address is not working. You can disregard this message."

Furthermore, there were numerous (40) references to the student's own experience. For example, one student stated, "We did an informal survey in one of my classes several years ago." Another student in another context related that, "I have done something like this in the classroom." The students also made frequent reference (41) to the course reading material. An example of this was, "I honestly felt that the two Heinich articles contributed little to defining the ID field," and "the Merrill article really annoyed me because..." There was also reference made to relevant material outside the course reading (17). For example, "There was an article many years

ago (I have the reference somewhere), that stated..." In other instances, title and author of the references were given. One student said, "I found a paper at this WWW site: http://129.7.160.78/intro.html. I thought this was appropriate given our discussion last night." New ideas were initiated in 14 of the communications. An example of a new idea and a reference to reading outside the course reading was, "In discussing the nature of concept learning (Love and Snow) what role does primary experience and representational experience play in conceptual understanding? How do infants begin to conceptualize? Is there a transition from a behaviorist learning model to a constructivist learning model?"

It is clear from study of the communications that the answers to the five sub questions under question one are all yes. The evidence for critical thinking as manifest by the listserv communications was very strong as defined by Mason (1991).

Questions two and three were intended to discover if misunderstandings occurred as a result of using listserv for the group discussion instead of being together in the same room. There were ten instances in the communications that indicated a lack of understanding of a previous message. It is likely that all of these were misunderstandings that could easily have occurred in face-to-face discussions and were not attributable to the medium of communication itself. In each case these misunderstanding were easily and quickly corrected by an ensuing communication. An example of was, "In response to all of this, I actually did not mean the physical environment as much, rather the myriad of activities (lectures, homework, classwork) which composes the learning environment."

One of the potential weaknesses of using listserv as a means of class discussion is that it would result in dry dialogue devoid of emotion that would be found in classroom discussion. Examination of the communications revealed several instances (54) of humor injected into the discussion. Some of these were only emoticons such as, "<G>" for "grin" or ":-)" for "smile" but other messages were intended to be humorous, and they were. For example, one student asks, "The peanut gallery would like to propose a question to the powers that be." Dr. Morrison later responds, "Deborah, is she talking about us????" Another instance of humor is found when a student states, "Unfortunately it would be easier to break into Fort Knox than a Canadian school in July." Further humor is demonstrated in this response, "Jeff squirms in mock pain: Excellent retort. I am proud of my personality disorder. It has made me kind of a legend at my school. Weren't all those HyperCard stacks a form of programmed instruction? Hmm?" One last example of humor is shown in this response, "I am not a behaviorist nor a cognitivist. I am a PANIST. Consider the needs of your students and use the most appropriate methods, and it will always PAN out."

Another example of expressing emotion was this, "Behaviorist and Constructivist differ on picture perception (insert sarcasm here.)"

There was evidence that students changed their point of view because of the listserv. "Now that I have a connection, let me answer once and forever about what has dominated the previous discussions. I do have strong feelings about the comparisons, but have changed my opinion considerably....."

There were also some hurt feelings (2) revealed in the communications. Well into the seminar one student exclaims, "Please start spelling my name right!" On another occasion a student responds, "You wound me deeply. I have a great deal of respect for Dr. X."

Analysis of Questionnaire

The questionnaire was answered by six of the eight students in the class. Attempts were made to complete the questionnaire by telephone for the two non-respondents, but this attempt was not successful. Table I summarizes the responses to the questionnaire.

The students were unanimous in liking the listserv discussion because it gave them more time to think about their contribution. One student stated, "I liked being able to think over my answers before giving them. I felt that my level of interaction was deeper because I wasn't giving instant answers to questions posed." Another student liked using the listserv because she felt more comfortable with it than with face-to-face discussion.

Reasons for disliking the listserv discussion were that it was very time consuming, it was sometimes difficult to follow the discussion, and there was a lack of visual and auditory nuances found in a classroom discussion. One student stated, "I found that sometimes I unintentionally irritated a few people simply because they didn't have enough cues, visual etc. or auditory, tone of voice to perceive my statements in the manner in which they were intended."

The most valuable aspect of the listserv discussions mentioned by four of the six respondents was its convenience. They were not bound to appear in a class at a certain time, thus allowing them to pursue other

activities and participating in the class discussion to fit their own schedule. It also eliminated geographical problems and allowed one student to participate from Canada. Another student felt the listserv was valuable because it forced constant preparation in order to participate in the discussion. One practical aspect of using a listserv mentioned was that it allowed an accurate hard copy transcript of the class discussion.

Some of the drawbacks to using listserv that were mentioned were an unfamiliarity with e-mail by one student, and difficulty in getting access to a computer terminal by another student. Two students found no drawbacks.

Improvements suggested for using the listserv included keeping the discussion on the topic, limiting the time for discussion, being sure everyone participated, and not being required to lead the discussion for a full week.

The students generally felt that the role of the faculty should be that of a facilitator in the discussion. Two students would have liked the faculty to participate more than they did. The two faculty members contributed 130 messages out of the total of 594 for the course. Two students mentioned that they thought it important for the faculty to keep the discussion focused on the topic.

When asked if they would enroll again in a class conducted using a listserv for discussion, four students responded positively, one was uncertain, and another stated, yes, if it was the only option. The majority of the students believed that a face-to-face class meeting was essential, that the class should be restricted to about 10 students, and that it probably would not work well for undergraduates. If the class were international in scope, it would be important to have background information on the other students.

Table 1. Summary of Student Questionnaire
(Not everyone responded to every question?)

Question	Response	Frequency	Example
1. What did you like about using e-mail instead of personal class interaction?	(a) gave time to reflect on answers	6	(a)"I liked being able to think over my answers before giving them. I felt my level of interaction was deeper because I wasn't giving instant answers to questions poised."
	(b) relieved uneasiness about class discussion	1	(b) "I do not really enjoy discussion classes because I am not comfortable in them and e-mailing took away some of the uneasiness."
2. What did you dislike about using e-mailing instead of personal class interaction?	(a) discussion hard to follow	2	(a) "The main component I disliked about e-mail was the lack of ease in following the discussion. ....it was hard....to remember or to tell who was sending the e-mail."
	(b) lack of visual and auditory cues	2	(b) "I found that sometimes I unintentionally irritated a few people simply because they didn't have enough cues, visual etc. or auditory, tone of voice to perceive my statements in the manner in which they were intended."
	(c) took more time	2	(c) "It seemed as if it took more time to read all the messages and I got overwhelmed. Also it limited my involvement"
	(d) personal behavior	1	(d) "...another member of the class and I had a tendency to 'gang up' on certain class members."

3. Describe the most valuable aspects of being involved in the listserv discussion.	(a) convenience of not having class meetings	4	(a) "...the convenience of not having to come to scheduled class meetings."
	(b) forced preparation	1	(b) "The self-imposed pressure to be 'prepared' at all times through keeping up and reading more than what was required."
	(c) doing something new	1	(c) "To be in on breaking new ground-doing something new....."
	(d) have accurate transcript	1	(d) "The fact that I have 100% accurate transcript of every discussion that took place in the class."
4. Describe the least valuable aspects of being involved in the listserv discussion.	(a) not accustomed to e-mail	1	(a) "I was not accustomed to sing e-mail, so the information given at each message was a distraction."
	(b) access to a terminal	2	(b) ".....I had to beg or borrow terminal time."
	(c) none	2	(c) "I don't feel there is any least valuable aspect."
	(d) took more time	1	(d) "The time involved each day to read the message. It curbed my interaction."
	(e) lack of personal interaction	1	(e) "Lack of personal (face-to-face) interaction."

5. How could the e-mail discussion be improved?	(a) make sure everyone participates	1	(a) "Make sure that everyone on the listserv participates...."
			(a) "It was irritating that some classmates could 'lurk' with only occasional comments and get the same grade as those of us who put a lot of effort into the class."
	(b) not lead discussion for full week	1	(b) "The responsibility for 'carrying' the discussion for a solid week was overly time consuming and could be less."
	(c) time limit on discussion	2	(c) "Put a cap on the types of replies. A lot of it was meaningless conversation at times."
	(d) need guidelines on how to respond	1	(d) "...setting up guidelines on how to respond to each other such as copying in the original comments, etc."
	(e) introduce subject & respondent	1	(e) "...emphasizing the importance of introducing the subject and respondent at the beginning of each message."
	(f) discussion got off topic	3	(f) "I think the professors involved let the discussion get off topic and somewhat out of control from time to time."
6. What role do you think the faculty should play in the course discussion?	(a) assume role of facilitator	3	(a) "The faculty should play the role of facilitator."
	(b)participate more	2	(b) "I think faculty could participate in the discussion more through posing questions, scenarios, etc."
	(c) keep on topic	3	(c) "To keep the listserv on topic."
7. How would you evaluate the faculty participation in the listserv discussion?	(a) adequate	3	(a) "Faculty participation was adequate."
	(b) less	1	(b) "Less than I would like."
	(c) excellent	1	(c) "Excellent!"
8. Would you enroll for another class using this method of class interaction?	(a) uncertain	1	(a) "I'm not sure if I would enroll in another e-mail course. It would depend on the class and the faculty involved."
	(b) definitely yes	4	(b) "Oh definitely..."
	(c) if only option	1	(c) "If it were the only option."

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9. Do you think some class meetings are essential or could the class interaction be entirely by e-mail with no meeting?	(a) yes	5	(a) "I felt more comfortable knowing who I am responding to and being able to connect a face to the e-mail message."
	(b) no	1	(b) "No meetings are necessary. We got the same results whether we met or not."
10. How large of a class do you believe this mode of communication would accommodate?	(a) 6-10	4	(a) "At most 10."
	(b) 10-20	1	(b) "Ideally, 10-20 because of the number of e-mail messages that would have to read."
	(c) larger is better	1	(c) "In fact, the larger the group the richer the discussion."
11. Do you think this means of communication could be done at an undergraduate level? Please explain your answer.	(a) probably no	5	(a) "No, classes are too large."
	(b) yes	1	(b) "Yes, if the motivation can be instilled."
12. If this method of communication were done on an international and intercultural level, do you think that a certain amount of background information about the participants be necessary or desirable to help in communication? What type of information would e beneficial?	(a) need to know backgrounds	4	(a) "I think background information would be a necessity because you would most certainly encounter communication problems related to cultural assumptions and ignorance."
	(b) agree on style of writing	1	(b) " A conventional style of writing should be agreed upon and there might need to be additional discussions concerning the nature and involvement of the course."
	(c) need to be personally acquainted	1	(c) " ...I think that the members of the class all need to be personally acquainted for this to work."
	(d) possible language barrier	1	(d) "Yes, the language would be a barrier."

13. Do you have any additional comments?	(a) none	2	
	(b) enjoyed	1	(b) "I thoroughly enjoyed the listserv class last summer..."
	(c) good experience	2	(c) "It was a wonderful experience that I highly recommend to anyone looking for a class which is a little different."
	(d) need only 1 teacher	1	(d) "I think only one faculty member is needed for such a course."
	(e) have practice session	1	(e) "Have a short practice session before the first round of discussion."
	(f) have minimum & maximum number of replies	1	(f) "Have a minimum and maximum number of replies for each participant."

Summary of Faculty Interviews

Both of the faculty members believed this course was successful in achieving its purpose. Dr. Morrison stated, "So, overall I think we introduced them to some new ideas, new concepts, so they changed their...own belief systems, which is good. So, overall I think it was a success." Dr. Lowther also believed the course was successful, and to support this she stated, "From their responses we could see that they were learning.... We thought it was very successful."

The faculty were also in agreement that the great advantage of conducting the class discussion by listserv was its convenience. "It gives you the advantage in that you can participate at any time during the day and during the week," Dr. Morrison observed, and he also pointed out , "Taking the PowerBook with us, we could call (from) any place in the country and still participate and manage the instruction."

Another advantage mentioned by Dr. Morrison was that it gave the students time to form thoughtful replies. "People had a chance to let ideas gel, to read the stuff and go back and read it (again). In a conversation it comes by you one time, and that's it." Dr. Lowther observed, the students "liked the idea of being able to compose their thoughts."

Dr. Morrison pointed out an advantage not alluded to by anyone else, in that the discussion could be personalized. "You can also carry on a one-to-one conversation. So if someone disagrees with you, or they don't understand, then you have more time to tutor them or to explain your ideas, your thoughts."

The only disadvantage the two faculty members found was that the listserv discussion was very demanding. "It was 24 hours a day, 7 days a week. I mean e-mail was going continuously, and if you skipped a day, you were out of luck." Dr. Lowther said, "It was very, very time consuming to read all of the messages that the students were sending."

One suggestion to improve future classes using listserv for discussion was to limit and schedule the time for discussion. Both faculty members concurred in this. The faculty members were also in agreement concerning their advice for future classes using listserv. They would limit the enrollment to a size that is manageable for everyone. The class should be one that is content rich and where discussion is important and not dependent on lecture for presentation. The students should be adept at using e-mail, and it is helpful if they are acquainted with each other. If they are not acquainted, some biographical information would be helpful.

Table 2. Summary of Faculty Interviews

Question	Answer	Quote
What made you decide to conduct the class discussion by Listserv?	Convenience and flexible hours	" It sort of opened the classroom up and gave us the chance to hold the class without disrupting anybody's life schedules for the summer." Dr. Morrison "It was convenience." Dr. Lowther
What were the goals you had for this course?	Introduce the students to classical instructional design literature	"We wanted to introduce them to some literature that we may have just touched on in the classes but had not gone into in detail. This gave them a chance to read articles and talk and discuss the article." Dr. Morrison "We thought that to get that knowledge and understanding was to do quite a bit of reading and then to do some analysis after the reading ....then to discuss with your peers some of the ideas you had." Dr. Lowther
How would you describe your success in reaching these goals?	They learned	"They were able to carry on an intelligent...what I thought was an intelligent conversation. They changed their opinions about some of the concepts and ideas in those articles." Dr. Morrison "From their responses we could see that they were learning." Dr. Lowther

Describe the advantages of conducting the class discussion by listserv instead of in person?	Strengths: Flexible hours	"It gives you the advantage in that you can participate at any time during the day and during the week." Dr. Morrison
	Flexible location	"Taking the PowerBook with us, we could call any place in the country and still participate and manage the instruction." Dr. Morrison
	Time for thought	"But people had a chance to let the ideas gel, to read the stuff and go back and read it, where in a conversation it comes by you one time and that's it." Dr. Morrison "They (students) liked the idea of being able to compose their thoughts." Dr. Lowther
	Discussion could be personalized	"You can also carry on a one to one conversation. So, if someone disagrees with you or they don't understand, then you have more time to tutor them or to explain your ideas...your thoughts." Dr. Morrison
	Convenience	"It was convenience." "Students really liked being able to stay home." Dr. Lowther
	More accountable	".....it was in written form made them more accountable for what they say." Dr. Lowther

Describe the disadvantages of conducting the class discussion by listserv instead of in person?	Weaknesses: Demanding in time	"Instead it was 24 hours a day 7 days a week. I mean e-mail was going continuously. And if you skipped a day you were out of luck." Dr. Morrison "It was very, very time consuming to read all of the messages that the students were sending." Dr. Lowther
	Misinterpret e-mail	"...sometimes you misinterpret the e-mail." Dr. Lowther
What problems did you experience using this means of communication?	Referring to past statements	" The greatest problem was knowing how to refer to a past statement." Dr. Lowther
	Learning to summarize	"Learning how to summarize what someone said without loosing the richness of it without having to paste in the whole statement." Dr. Lowther
How could the e-mail discussions have been improved?	Suggested time frame	"I think that in the future we need to look at ways of limiting that. Like...We've talked about Monday, Wednesday, Friday, or Tuesday, Thursday, Sunday are the only days you can post responses" Dr. Morrison
	Guidelines	"There needs to be some guidelines on the length of what you can do." Dr. Lowther
How, as an instructor, did you evaluate each participant's contribution?	Twenty percent of grade was discussion	"We sort of kept an anecdotal reports or journal during the week as to who was communicating, what was going on and who was changing ideas." Dr. Morrison " We would just watch. And see what was going on." Dr. Lowther "We had an overall assessment to where they turned in papers." Dr. Lowther

Do you think the listserv is suitable for any class or is it limited to certain types of instruction? If so, what are the limitations?	Adapting the listserv to: Discussion class: Lecture class:	"Discussion type class seems best suited for Listserv." Dr. Morrison "I think it has to be a class that is content rich." Dr. Lowther "In say a typical lecture...standing up lecturing and students listening, taking notes, I think you could have the listserv going as a discussion of the lectures. Particularly if the lecturer would post his or her notes or some questions. Then you could have the students discuss those questions related to the lecture."
Would you consider conducting this class entirely by Listserv?	We did that	"Well, that is sort of what we did with this one. Since it was discussion that worked out just fine." Dr. Morrison "Yeah, we did it with this one." Dr. Lowther
How large of a class would this listserv be suited for?	There is an upper limit	"I think there's probably an upper limit. If you got above 20 it may just get too humongous." Dr. Morrison "I think you could possibly do it with 15." Dr. Lowther "If you had a class of 300 you might want to have many separate individual listserves." Dr. Morrison "...with 300 people you would have too many lurkers. There is no way they could all participate. ...but you could have specific groups that had to actively participate during specific times in the semester while the rest are lurkers." Dr. Lowther

How much participation by the teacher should occur?	Participant	"You can be a participant and join in the discussion and present your points of views, and questions other people's point of views." Dr. Morrison
	Facilitator	"Or you can basically settle back and do nothing until someone gets out of hand." Dr. Morrison "I saw my role as a guide...a mentor. A facilitator not an instructor." Dr. Lowther
What is the role of the teacher in leading the discussion?	Multi-faceted	"It's multi-faceted." Dr. Morrison
All the participants were computer competent. What prerequisite should a student have for this course? to what extent must the student be computer competent?	Competent with e-mail	"Well, they have to be pretty competent with e-mail." Dr. Morrison "They need to know how to use e-mail. Save a document, create it, send it, and be able to open it and reply." Dr. Lowther
If you were to conduct this class again and use the listserv for the discussion, what would you do differently to improve the experience for the student?	List the times	"I think the big thing that we will do this summer is to list the times that you can post." Dr. Morrison "I think a little more structure.....a little instruction about e-mail. Some e-mail etiquette maybe." Dr. Lowther

Summary and conclusions

The listserv communications that occurred during the course of this seminar clearly demonstrated that this method of discussion was successful for the purpose of this class. Thematic analysis of the posts and application of Mason's (1991) criteria for evidence of critical thinking in computer communications gave evidence that the students were critically analyzing and synthesizing the course reading material.

Besides critical thinking, the messages also revealed the emotions of humor, hurt feelings and sarcasm although the participants felt that this was not comparable to the subtle auditory and visual nuances present in face-to-face discussion. Misunderstandings, which were infrequent, were due to content of messages and not due to the electronic media being used.

This method of class discussion had an advantage over face-to-face discussion in that it allowed the participants greater opportunity to consider their responses before contributing their reply. It also had the advantage of convenience because the participants did not have to be in a class at a certain time or in a certain place.

The main disadvantage in using listserv for discussion was that it was very demanding and time consuming. Another drawback mentioned by several students was that they missed the visual and auditory nuances present in a face-to-face discussion.

In future courses using listserv, scheduling at time for the discussion would help to solve the problem presented by a continuous flow of communication. Familiarity with the use of e-mail and ready access to a computer are important prerequisites for students in the course. It is also important for the faculty to keep the discussion focused on topic and to insure everyone participates while not allowing a few students to dominate the discussion.

Undoubtedly the availability of listserv for use in class discussion will make it possible to extend the availability of some courses of study and to enrich them as well by providing greater access to educational opportunities. As computer usage by students increases and availability of avenues of communication broaden, the use of this media for educational purposes will increase. It is important for educators to take full advantage of the potentialities of the advances in communication.

Although the use of listserv was successful for the purpose of this seminar, there are still many questions regarding the use of listserv that would occur in other classes. For example, what is the optimum class size for use of this media? What are the upper and lower limits of enrollment in such a class? Do the instruction methods of the faculty need to be adapted to this change in method of communication, and if so, what are they? Are some students better suited for listserv discussion while others face-to-face discussion? If so, how do we determine this? Could some subjects be improved by listserv discussion? For example, a class in political science might benefit from participation of students in other countries. All of these questions need further research in order to make the best use of this method of communication.

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